

**Motoman**

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**MSR-Series  
Positioner Manual**  
for MSR 200, 500, 1000 Sigma III

Part Number: 152988-1CD  
Revision: 2

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# NOTES

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# SECTION 1

## INTRODUCTION

### 1.1 *About this Document*

This manual provides general information about the MSR-series positioner, and contains the following sections:

#### **SECTION 1 - INTRODUCTION**

This section provides general information about the MSR-series positioner, a list of reference documents, and customer service information.

#### **SECTION 2 - SAFETY**

This section provides information regarding the safe use and operation of the MSR-series positioner.

#### **SECTION 3 - DESCRIPTION OF EQUIPMENT**

This section provides detailed descriptions of the major components of the MSR-series positioner. It also includes a table, listing component specifications.

#### **SECTION 4 - INSTALLATION**

This section provides instructions for installing the positioner.

#### **SECTION 5 - TOOLING RECOMMENDATIONS**

This section provides guidelines for customer-supplied tooling design.

#### **SECTION 6 - MAINTENANCE**

This section provides detailed instructions for maintaining each MSR-series positioner.

#### **APPENDIX**

Appendix A provides exploded views and illustrated parts lists for the MSR-series.

### 1.2 *Customer Service Information*

If you need technical assistance, contact the Motoman service staff at 937.847.3200. Please have the following information ready before you call:

- Product (Type I or Type II MSR-series positioner)
- Serial Number

### 1.3 *Operation*

The MSR-series positioner uses a reciprocating rotary motion to sweep each side of the circular turntable from the operator's loading zone, into the robot's work zone, and back to the operator side again. The optional continuous rotation package continues the sweep around in the same direction, clockwise or counterclockwise, as the previous sweep. Refer to your Continuous Rotation instruction manual for more information.

## 1.4 System Overview

The MSR-series rotary positioner provides controlled rotary motion and can be mounted in any orientation needed. The standard configuration utilizes an AC servo-motor, a high-ratio gear reducer, table top, and housing. It also includes integral position switches.

### 1.4.1 System Layout

An arc screen divides the table top in half, providing two semicircular work areas labeled SIDE A and SIDE B. When SIDE A is in the robot's welding zone, SIDE B is facing the operator and is ready to be loaded or unloaded with parts, and vice versa. Loading fixtures are supplied by the customer.

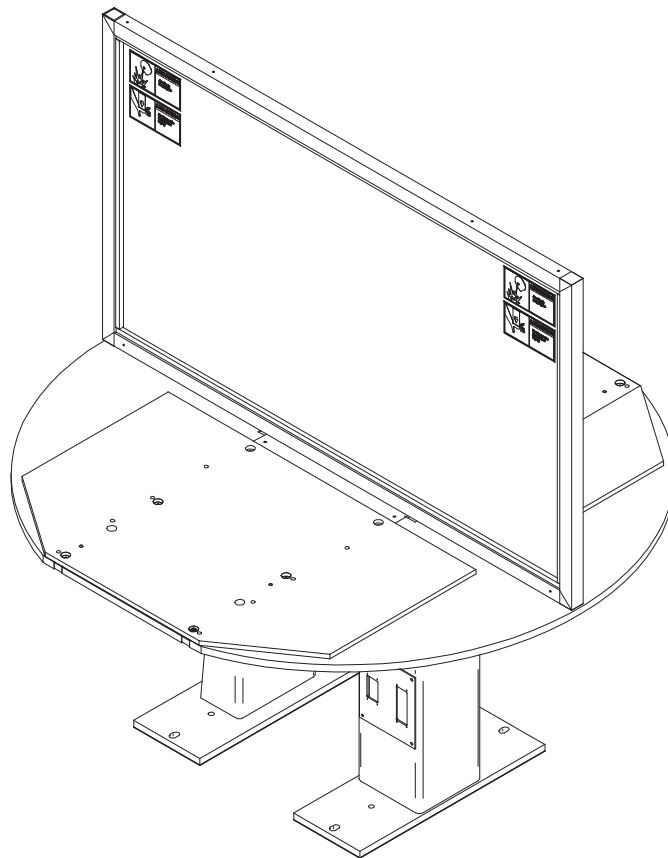


Figure 1-1 System Layout – Type I



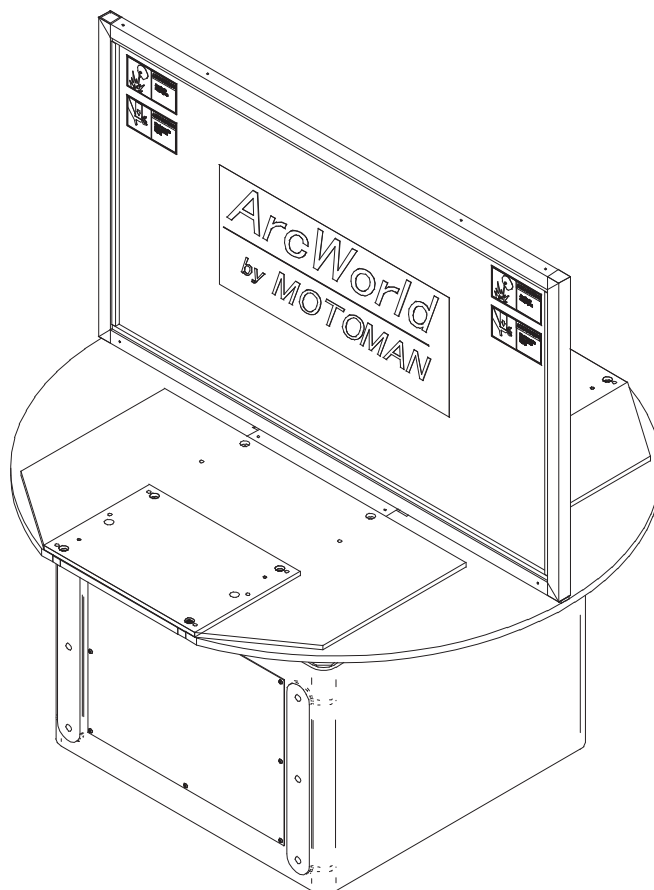


Figure 1-2 System Layout – Type II

### 1.4.2 System Identification

Each MSR-series positioner has identification label, located at the base, that contains specifications for the positioner (see Figure 1-3).



Figure 1-3 Identification Label.

## **1.5**      *Reference to Other Documentation*

For additional information refer to the following:

- MH-Series Sigma III Positioner Manual - Motoman P/N 152763-1

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# SECTION 2

## SAFETY

### 2.1 Introduction

**It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.**

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06. The address is as follows:

**Robotic Industries Association**

900 Victors Way

P.O. Box 3724

Ann Arbor, Michigan 48106

TEL: (734) 994-6088

FAX: (734) 994-3338

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)

## 2.2 *Standard Conventions*

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information provided under these headings which are defined below (in descending order of severity).



### ***DANGER!***

*Information appearing under the DANGER caption concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.*



### ***WARNING!***

*Information appearing under the WARNING caption concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.*



### ***CAUTION!***

*Information appearing under the CAUTION caption concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.*

**NOTE:** *Information appearing in a NOTE caption provides additional information which is helpful in understanding the item being explained.*

## 2.3 *General Safeguarding Tips*

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06, section 6.13.4 and 6.13.5, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

## 2.4 *Safety Devices*

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety measures are available:

- Safety fences and barriers
- Light curtains
- Door interlocks
- Safety mats
- Floor markings
- Warning lights

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

## 2.5 *Installation Safety*

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

## 2.6 *Programming Safety*

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications to PART 1 of the controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1. Making any changes without the written permission of Motoman will **VOID YOUR WARRANTY!**
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. **YOUR WARRANTY WILL BE VOID** if you use these special passwords.
- Back up all programs and jobs onto a floppy disk whenever program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place.
- Check the E-STOP button on the teach pendant for proper operation before programming.
- Carry the teach pendant with you when you enter the workcell.
- Be sure that only the person holding the teach pendant enters the workcell.
- Test any new or modified program at low speed for at least one full cycle.

## 2.7 *Operation Safety*

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

- Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Ensure that all safeguards are in place.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.

## 2.8 *Maintenance Safety*

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).



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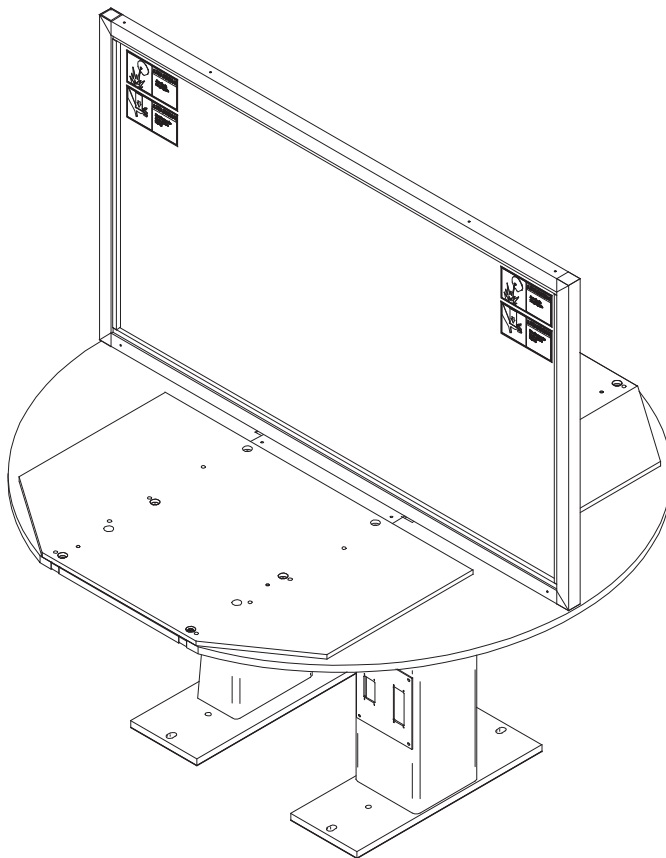
## SECTION 3

# EQUIPMENT DESCRIPTION

The MSR-series rotary positioners consist of an AC motor plus gear reducer. Position switches are included as a standard feature.

### 3.1 *MSR-series Rotary Positioner – Type I*

The Type I positioner is designed around the MH500 drive assembly. The MH500 is mounted vertically between two steel columns and is primary drive component for the rotary table.



*Figure 3-1 MSR-series Positioner Type I*

### 3.1.1 Additional Components

#### Ground Brushes

The MSR200 comes with factory-installed ground brushes (see Table 3-3). Additional ground brushes can be added as needed.

*Table 3-1 Weld Ground Brushes*

<i>Component</i>	<i>Standard</i>	<i>Option</i>
MSR200g – Weld ground brushes with rated *capacity	2 (800 Amp)	3 (1200 Amp)

\* Weld capacity is at 100% duty cycle.

### 3.1.2 System Specifications – Type I

See Table 3-2 for MSR-series Type I table specifications.

*Table 3-2 Type I Table Specifications*

<i>Series Component (Motoman P/N)</i>	<i>MSR200 (147030-1)</i>
Rated Load (per side) – kgf	200
Standard Table Diameter – mm/inch	1525/60
Table Center Through Hole – mm/inch	None
Base to Table Height – mm/inch	755 (29.72)
180-Degree Sweep Time – sec	3.7

For detailed performance specifications on the MH500 drive assemblies, see the MH-Series Sigma III Positioner Manual (P/N 152763-1).

### 3.1.3 Arc Shield



#### **WARNING!**

***Do not operate this equipment unless the arc screen is in place or eye damage can occur!***

The Motoman MSR-series positioner has an arc screen that runs the width of the positioner table and visually separates the loading zone from the welding zone. This screen acts as a shield to protect the operator from the arc radiation and sparks produced by the welding operation. Do not operate this equipment in a welding application unless the arc screen is in place.

## 3.2 MSR-series Rotary Positioner – Type II

The appearance of the two Type II table positioners is same; capacity is the primary difference. The Type II, MSR-series drive assembly is designed around a cast-iron base and a steel arc screen.

The MSR-series, Type II table positioners (see Figure 3-2) are available in two different configurations:

- MSR500
- MSR1000

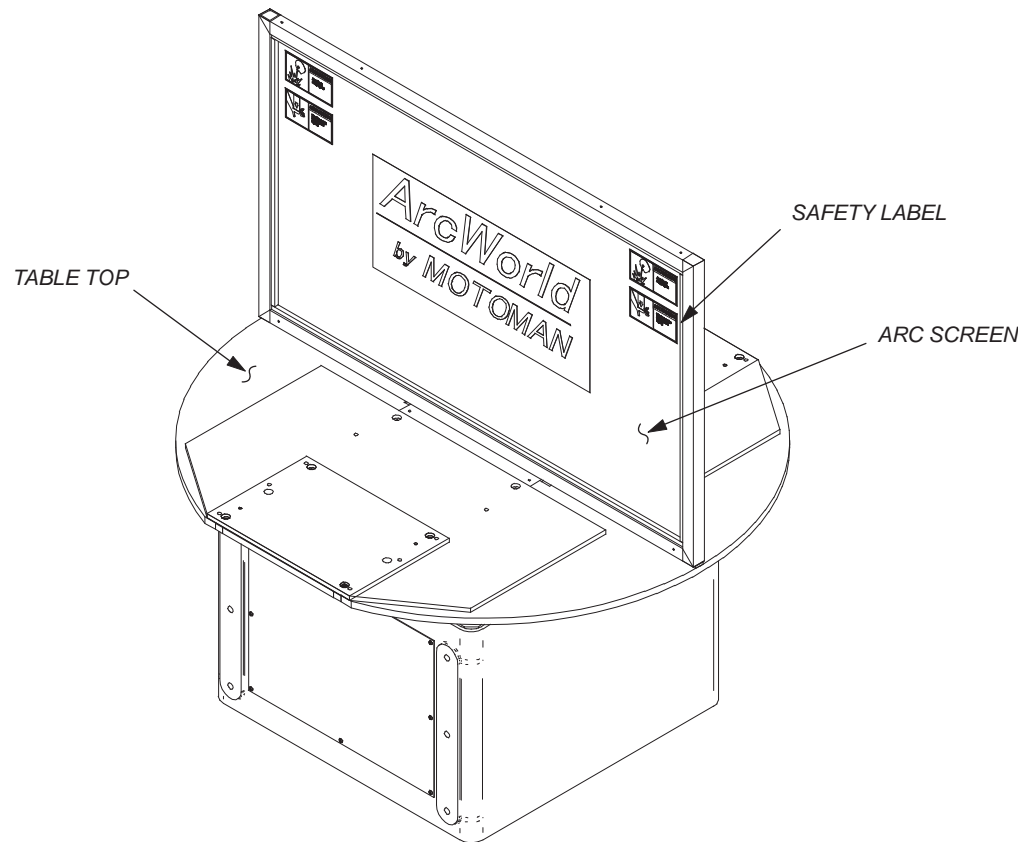


Figure 3-2 MSR-series Positioner Type II

### 3.2.1 Additional Components

#### Ground Brushes

The Type II positioners come with factory-installed ground brushes (see Table 3-3). Additional ground brushes can be added as needed.

Table 3-3 Weld Ground Brushes

Component	Standard
MSR500 kg – Weld ground brushes with rated *capacity	3 (1200 Amp)
MSR1000 kg – Weld ground brushes with rated *capacity	3 (1200 Amp)

\* Weld capacity is at 100% duty cycle.

### 3.2.2 System Specifications – Type II

See Table 3-4 for MSR-series Type II table specifications.

*Table 3-4 MSR-series Type II Specifications*

<i>Series Component (Motoman P/N)</i>	<i>MSR500 (152960-2)</i>	<i>MSR1000 (152960-1)</i>
Rated Load (per side) – kgf	500	1000
Standard Table Diameter – mm/inch	1525/60	1525/60
Table Center Through Hole – mm/inch	110/43	110/43
Base to Table Height – mm/inch	780 (30.7)	
180-degree Sweep Time – sec	2.0	5.0

For detailed performance specifications on the MH1200/3100 drive assemblies, see the MH-Series Sigma III Positioner Manual (P/N 152763-1).

### 3.2.3 Arc Shield



#### **WARNING!**

*Do not operate this equipment unless the arc screen is in place or eye damage can occur!*

The Motoman MSR-series positioner has an arc screen that runs the width of the positioner table and visually separates the loading zone from the welding zone. This screen acts as a shield to protect the operator from the arc radiation and sparks produced by the welding operation. Do not operate this equipment in a welding application unless the arc screen is in place.

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# SECTION 4

## INSTALLATION

Installation of the MSR-series positioner should be performed by personnel who are familiar with this Motoman product. Follow established safety procedures **at all times** throughout the installation process. Failure to use safe work practices can result in damage to the equipment and injury to the workers.

### 4.1 *Materials Required*

This section identifies customer-supplied items and tools required to complete installation.

#### 4.1.1 *Customer-Supplied Items*

- Servo motion control unit
- Incoming power supply
- Two earth ground cables with two earth ground stakes

#### 4.1.2 *List of Tools*

- Safety glasses
- Level
- Adjustable wrench set
- Hammer drill with appropriate concrete bits
- Forklift and/or overhead crane
- Open-end wrench sets (standard and metric)

## 4.2 Site Preparation

Each MSR-series positioner should be firmly mounted on a machine base or foundation rigid enough to support the static and dynamic forces.

### Type I

To prepare your site, proceed as follows:

1. Clear the floor space needed for the positioner see Figure 4-1 for Type I or Figure 4-2 for Type II.
2. Gather all customer-supplied items and required tools listed in Section 4.1.

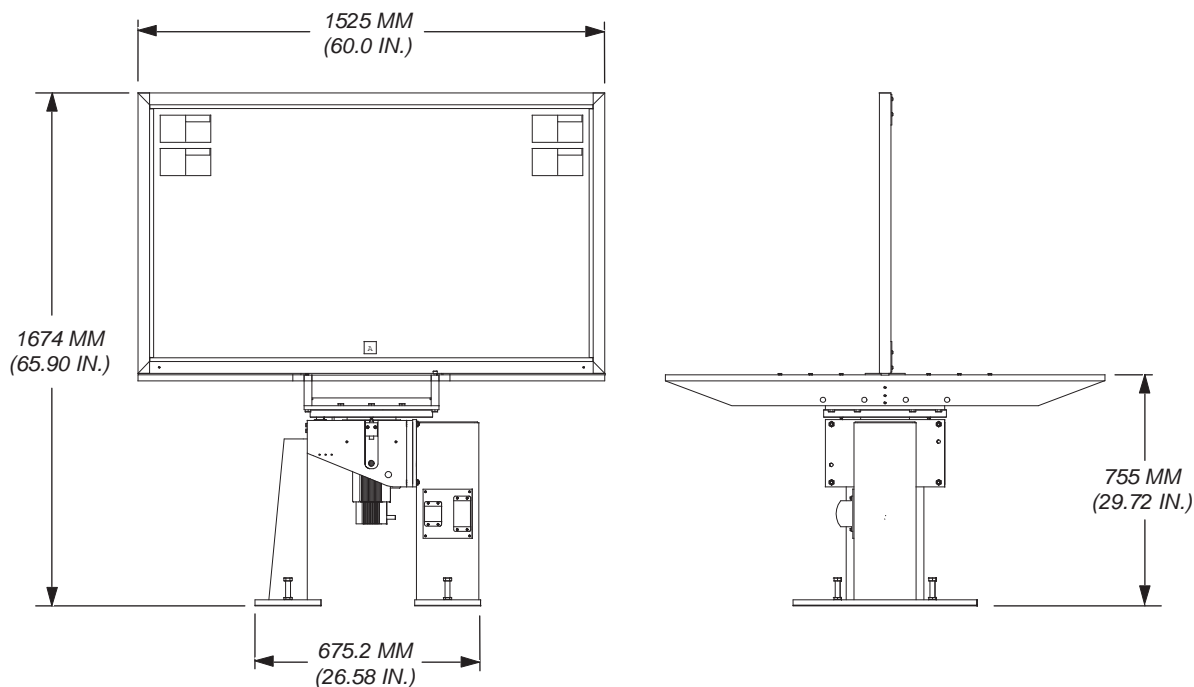


Figure 4-1 Area Needed for Installation – Type I

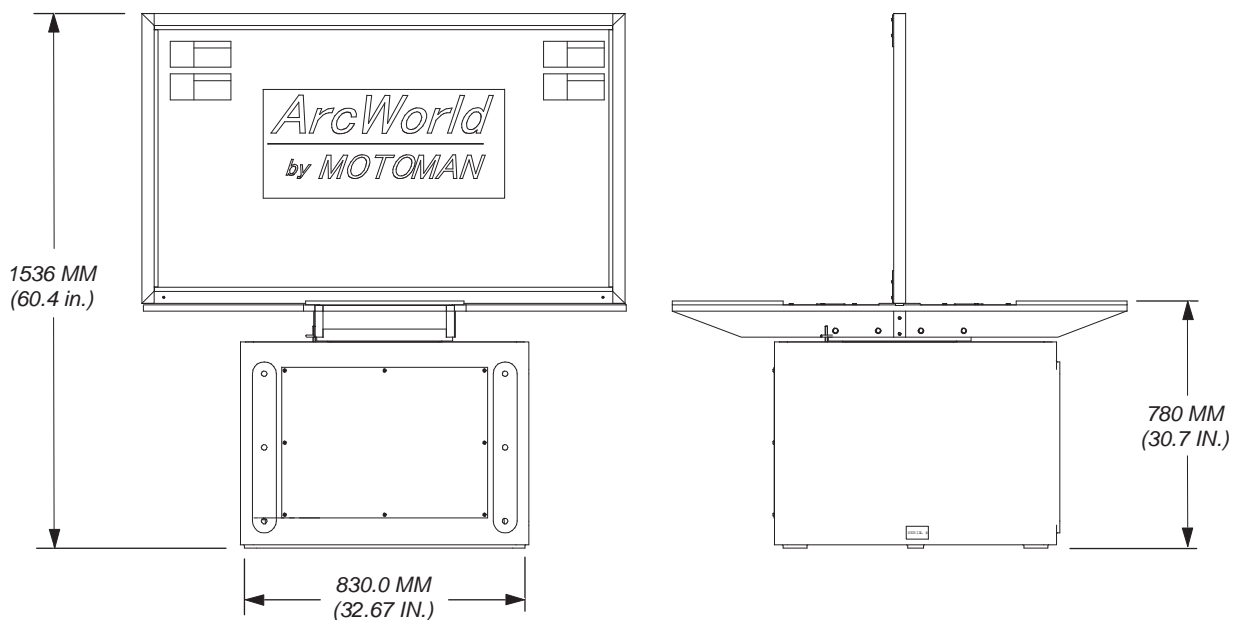


Figure 4-2 Area Needed for Installation – Type II

### 4.2.1 Mounting Hole Pattern

Use the mounting hole pattern in Figure 4-3 to accurately position the Type II MSR-series positioner on the floor or mounting base. Use the mounting hole pattern in Figure 4-3 to accurately position the Type II MSR-series positioner on the floor or mounting base.

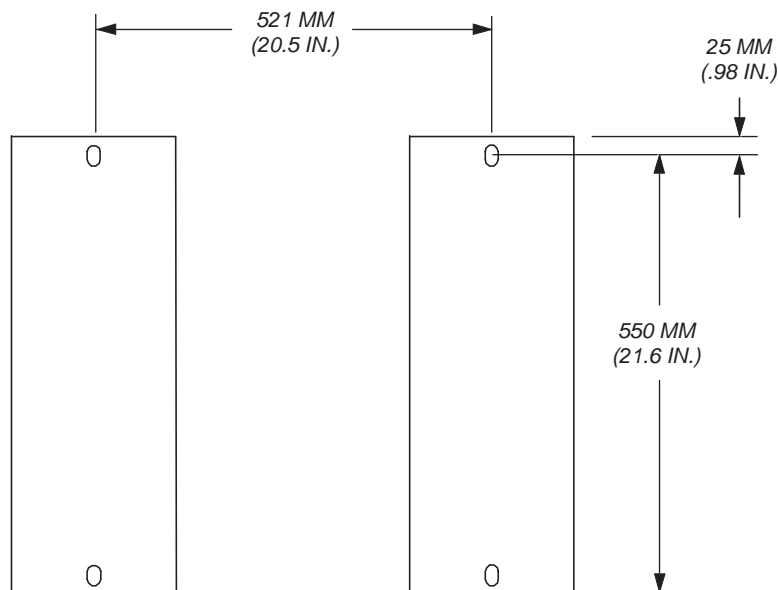


Figure 4-3 Floor Mounting Hole Pattern – Type I

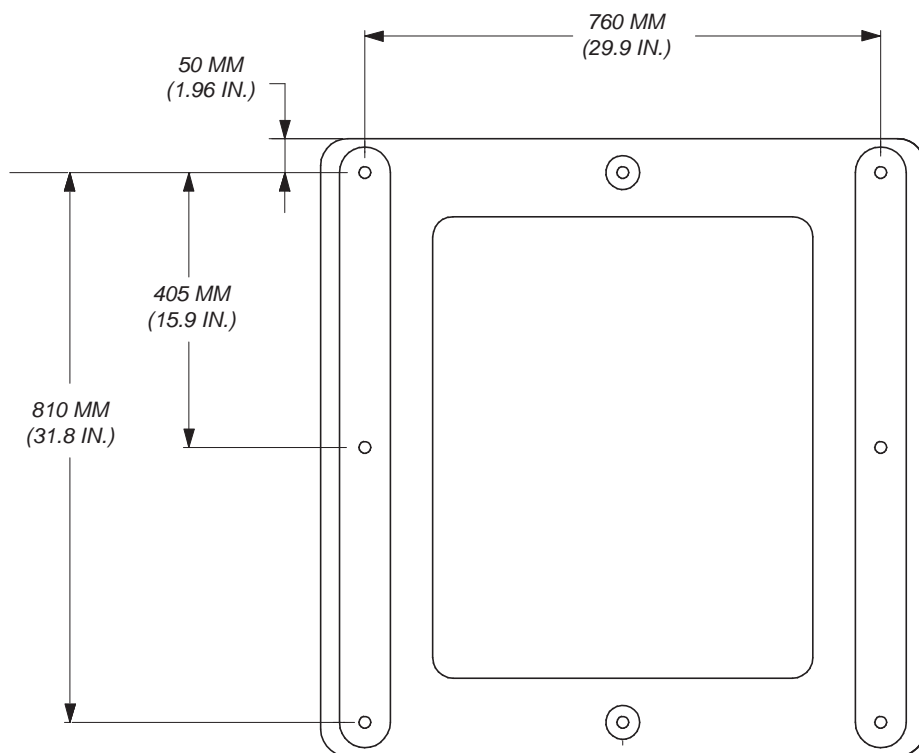


Figure 4-4 Floor Mounting Hole Pattern – Type II

## 4.3 Installing the MSR-series Table

The MSR-series table must be firmly mounted on a machine base or on a foundation rigid enough to support the static and dynamic forces.

### 4.3.1 Unpack and Install

The positioner table is shipped on a wood shipping pallet. To install the table, proceed as follows:



#### **WARNING!**

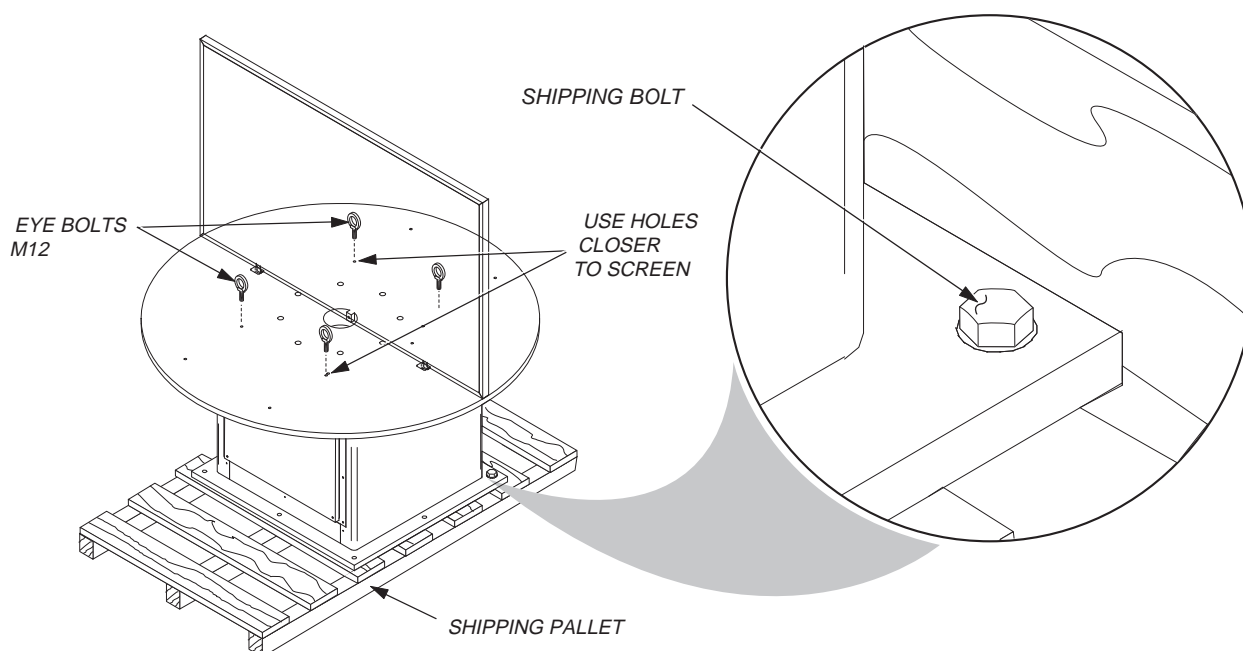
*The Type I MSR200 positioner weighs 450 kg (1000 lbs). The Type II MSR500/1000 positioner weighs 1200 kg (2700 lbs). Be sure that your lifting device is capable of handling this much weight or damage to the equipment or injury to personnel can result.*

1. Carefully remove protective plastic wrapping from system.
2. Inspect system for shipping damage.

**NOTE:**

*If any equipment is damaged, notify the shipper immediately.*

3. Unbolt table from wood shipping pallet using a 3/4-inch socket wrench.



**Figure 4-5 Unbolting the Table – Typical**

4. Insert two eye bolts (four total) on each side of the arc screen. Use the four bolts that are closest to the arc screen (see Figure 4-5).
5. Attach chains from lifting device to the eye bolts and raise the table from wood shipping pallet.
6. Place table in position.
7. Remove chains and eye bolts.



### 4.3.2 *Connecting the Cables*

Do not connect any cables until after the drive assembly is securely in place.

#### Connection to Motoman Controller

Two sets of cables lead from the controller to the positioner: I/O cable and power cable. These cables are sent through the back of the interface box and steadied with a gland plate. Connect these cables onto the interface panel.

- I/O Cables – One ribbon cable and two spares
  - a) The I/O ribbon cable fastens to the PC Interference Board.
  - b) Securely tie the spare wires out of the way.
- Power Cables – Three black cables and one green
  - a) The three black cables connect to the fuse holder block labeled 2, 4, and 6. See system drawings.
  - b) The green cable connects to the ground lug on the interface panel.

When the MSR-series table is delivered with a Motoman robot, connections between the two have been made at the factory. See separate schematics and/or documentation specific to your system.

#### Ground Cables

For ground cable installation instructions, see the MH-series Positioner Manual with MotoMount and Drive Assemblies (P/N 146703-1)

## 4.4 *Conducting a Safety/Operation Check*

Before operating the MSR-series system, take a few minutes to perform a safety/operation check. To perform a safety/operation check, proceed as follows:

1. Check that all cable connections are tight.
2. Check that the tooling is properly attached to table.
3. Make sure all loose components are removed from table.

# *NOTES*

## SECTION 5

# TOOLING RECOMMENDATIONS

The MSR-series table is now ready for the installation of tooling for your application. Installation of tooling should be performed by personnel who are familiar with the operation of this system. Tooling is supplied by the customer.

### 5.1 Tooling Recommendations

The customer-supplied tooling must be designed to fit the table top mounting holes (see Figure 5-1).

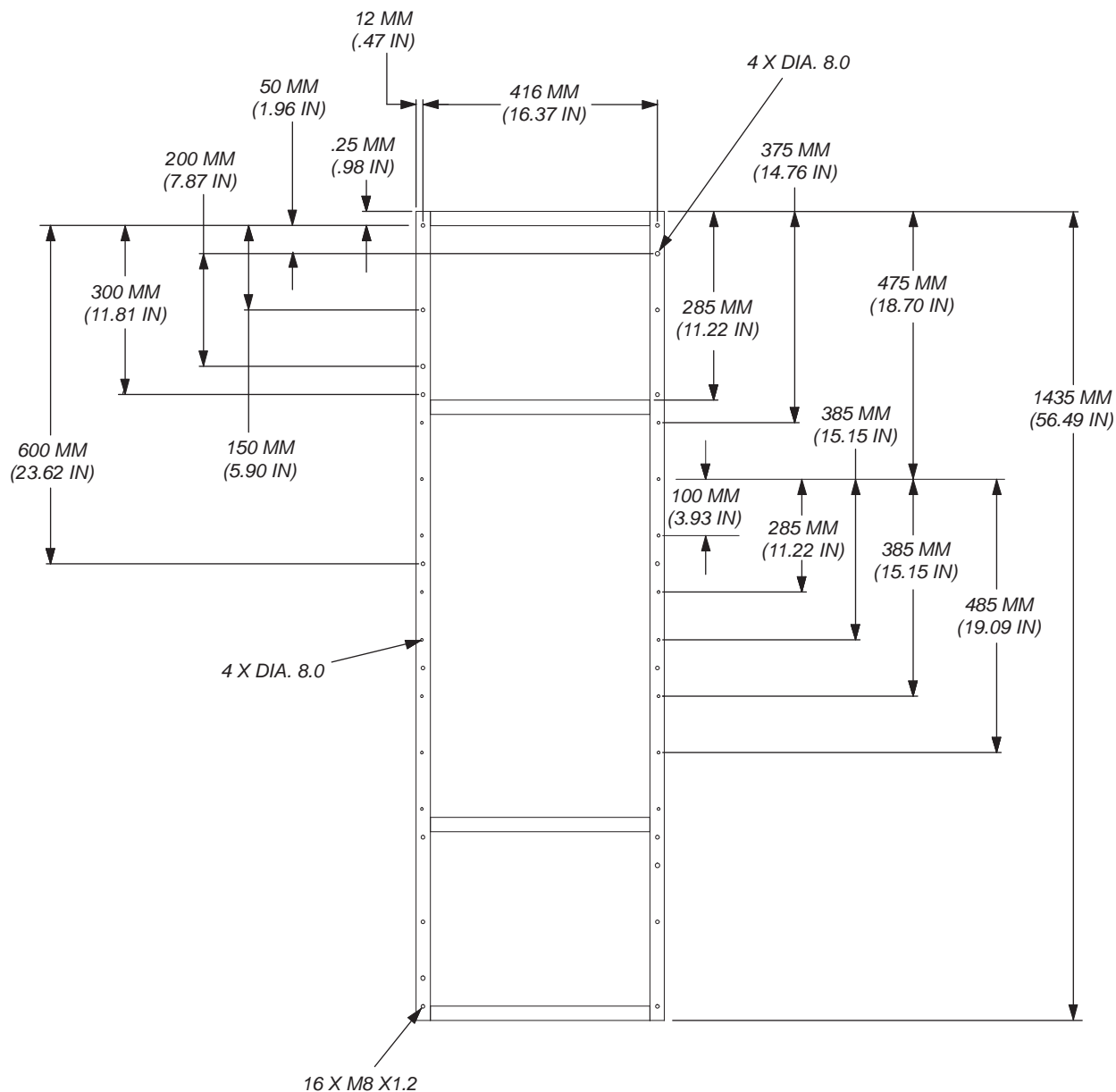


Figure 5-1 Fixture Mounting Holes

# NOTES

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# SECTION 6

## OPERATION

### 6.1 *Operating Instructions*

For operating instructions, refer to the MH-Series Sigma III Positioner Manual (P/N 152763-1).

#### 6.1.1 *Alarms*

To resolve alarms, refer to the MH-Series Sigma III Positioner Manual (P/N 152763-1).

# NOTES

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# SECTION 7

## MAINTENANCE

Maintenance of the MSR-series components should be performed only by authorized personnel who are familiar with the design and construction of this positioner. The following procedures should be performed only as needed. Read through the instructions completely before performing any maintenance procedure. Be sure that you understand the procedure, have the proper tools, and observe all applicable safety precautions.

### 7.1 *Spare Parts*

MSR-series tables are powered by MH-series drive assemblies. To identify the spare parts to keep on hand for the MH-series drive assemblies, see the MH-Series Sigma III Positioner Manual (P/N 152763-1).

### 7.2 *Ordering Parts*

When ordering spare parts, always state:

- Machine type (Positioner)
- Machine Name (MSR200/500/1000)
- Motoman Part No.
- Part name
- Number of parts

Send your order to: Customer Service  
Motoman  
805 Liberty Lane  
West Carrollton, Oh 45449  
Telephone:937.847.3200  
Telefax:937.847.3211

### 7.3 *Maintenance Schedule*

MSR-series tables are powered by MH-series drive assemblies. To schedule maintenance for the MH-series drive assemblies, see the MH-Series Sigma III Positioner Manual (P/N 152763-1).

## 7.4 Home Position

Any position of the table can be programmed as home. Resetting to factory home position is typically done before new tooling and fixturing is installed, or when the motor has been serviced.

### 7.4.1 Set Factory Home Position

To set the table to home position, proceed as follows:

1. Make sure the robot(s) is in home position.
2. Locate the homing hole on the positioner (see Figure 7-1 for Type I, see Figure 7-2 for Type II).

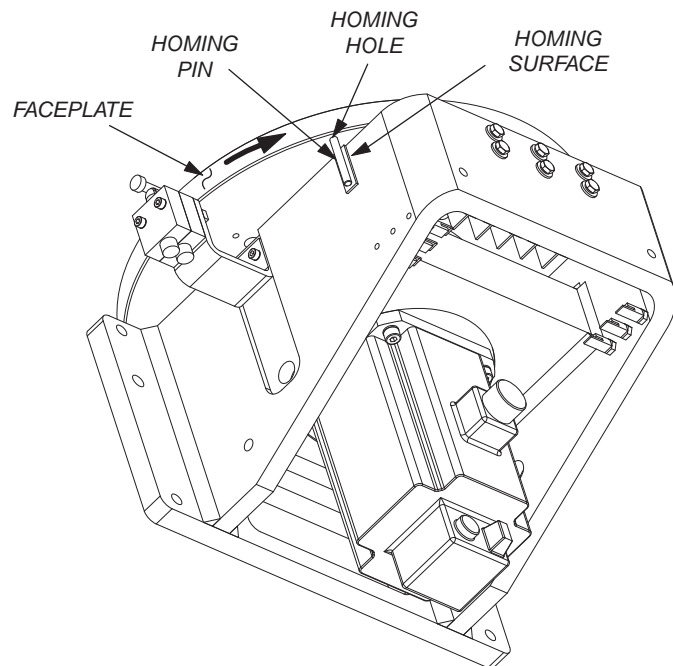


Figure 7-1 Factory Home Position – Type I

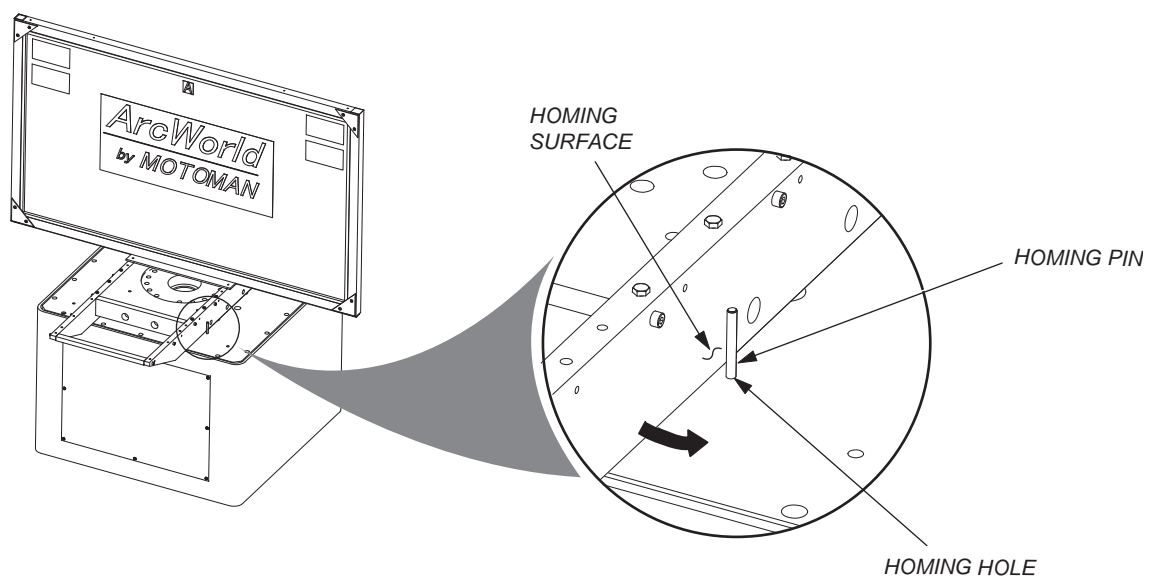


Figure 7-2 Factory Home Position – Type II



3. Jog the table until the homing hole and homing surface are close to each other.
4. Install the homing pin into the homing hole. The pin may need to be tapped in with a hammer.
5. **Slowly** jog the table until the homing pin just touches the homing surface. If it is jogged too far, the homing pin will bend, causing a gap at the top of the pin. Slowly jog the homing surface in reverse rotation until the gap closes.

### Programming

With home position found and the homing pin inserted, program home position in the controller:

- a) Switch programming pendant to MAINTENANCE MODE.
- b) Press TOP MENU key on programming pendant.
- c) Cursor to ROBOT and press SELECT.
- d) Cursor to HOME POSITION and press SELECT.
- e) Press the PAGE OVER key to the desired station (indicated in the top right corner).
- f) Make sure the table is in the position that you want to teach as home and press SELECT.
- g) Cursor to YES and press SELECT. The table is now reset to zero.
- h) Remove the homing pin.

## 7.5 *Troubleshooting*

MSR-series tables are powered by MH-series drive assemblies. For troubleshooting procedures for the MH-series drive assemblies, see the MH-Series Sigma III Positioner Manual (P/N 152763-1).

# NOTES

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# *APPENDIX A*

## *ILLUSTRATED PARTS LIST*

### *A.1 Introduction*

#### *A.1.1 General*

The Illustrated Parts List identifies, describes, and illustrates detail parts of the main assemblies for the MSR-series positioner manufactured by Motoman.

#### *A.1.2 Purpose*

This list provides parts identification and descriptive information for use in provisioning, requesting, purchasing, storing, and issuing spare parts.

#### *A.1.3 Arrangement*

Appendix A is arranged as follows:

Appendix A.1 – Introduction

Appendix A.2 – Illustrated Parts List

#### *A.1.4 Explanation of Parts List*

##### *Contents*

The parts list contains a breakdown of the equipment into detail parts. All parts of the equipment are listed except the following:

1. Standard hardware items (attaching parts) such as nuts, screws, washers, etc., which are available commercially.
2. Bulk items such as wire, cable, sleeving, tubing, etc., which are also commercially available.
3. Permanently attached parts which lose their identity by being welded, soldered, riveted, etc., to other parts, or assemblies.

**Parts List Form**

This form is divided into four columns as follows:

1. “Figure - Item Number” Column

This Figure column lists the figure number of the illustration applicable to a particular parts list and also identifies each part in the list by an item number. These item numbers also appear on the illustration. Each item number on the illustration is connected to the part to which it pertains by a leader line and arrow. Thus, the figure and item numbering system ties the parts list to the illustrations and vice versa.

2. “Motoman Part Number” Column

All part numbers appearing in this column are Motoman part numbers.

3. “Description” Column

The item nomenclature appears in this column.

4. “QTY” Column

This column indicates the quantity of parts required for an assembly or subassembly in which the part appears. This column does not necessarily reflect the total used in the complete end item.

## **A.2      *Parts List***

### **A.2.1    *Explanation of Parts List Arrangement***

The parts list is arranged so that the illustration will appear on left-hand page and the applicable parts list will appear on the opposite right-hand page. Unless the list is unusually long, the user will be able to look at the illustration and read the parts list without turning a page.

### **A.2.2    *Symbols and Abbreviations***

The following is a list of symbols and abbreviations used in the parts list.

amp – ampere  
AC – alternating current  
cyl – cylinder  
DC – direct current  
fig – figure  
hex – hexagon  
ID – inside diameter  
in. – inch  
m – meter  
mm – millimeter  
No. – number  
psi – pounds per square inch  
v – voltage

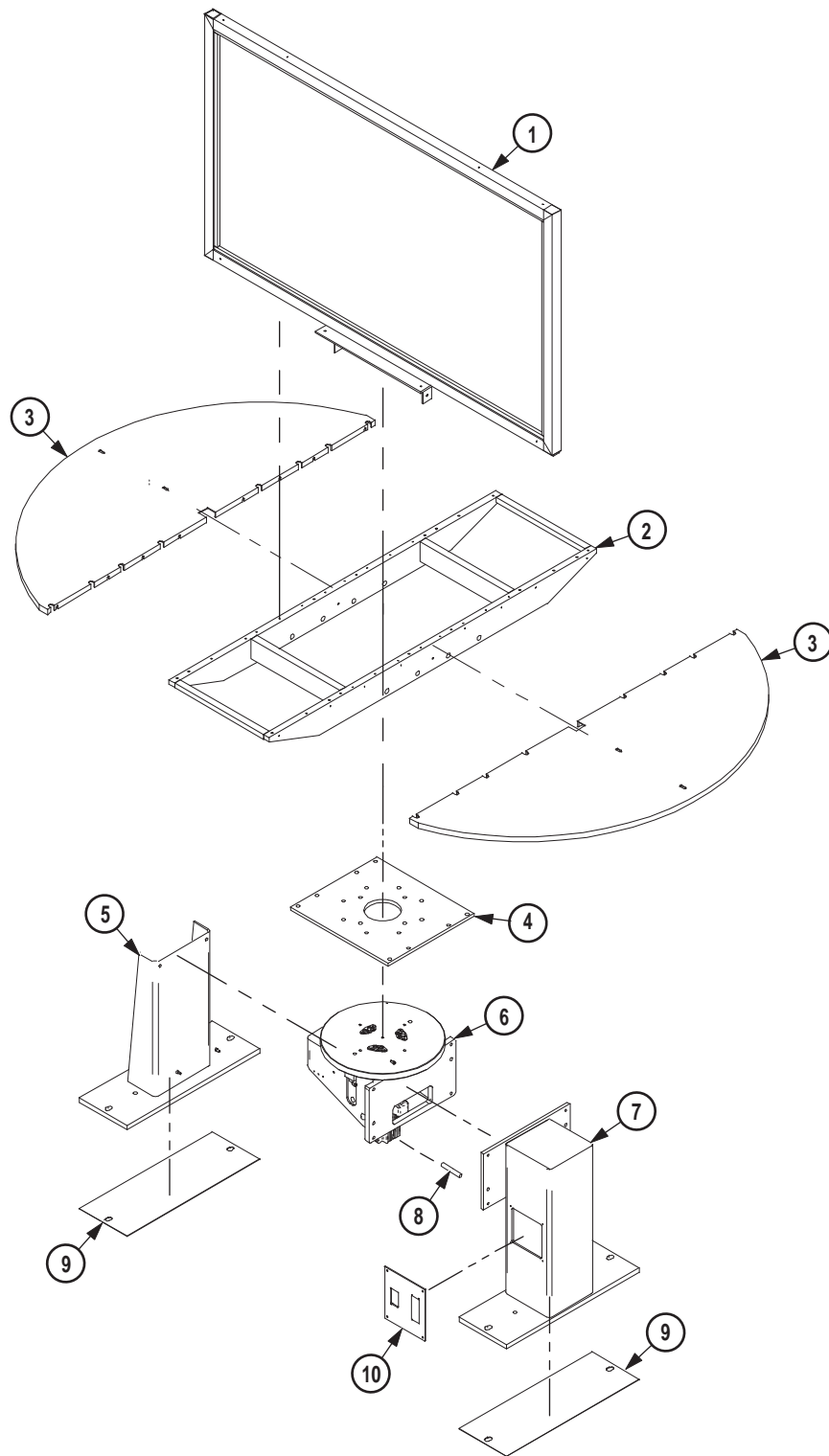


Figure A-1 MSR200 Components

Table A-1 Parts List – MSR200 Components

<i>Figure B-1 Item Number</i>	<i>Motoman Part Number</i>	<i>Description</i>	<i>QT Y</i>
	147030-1	POSITIONER ASSY, MSR200	1
1	146710-1	SCREEN ASSY, POSITIONER	1
2	146174-1	FRAME, TABLE, POSITIONER, ROTARY	1
3	146176-1	SHIELD, TABLE, POSITIONER, ROTARY	2
4	147201-1	PLATE, MOUNT	1
5	147034-1	SUPPORT, 450 kg DRIVE ASSY, AUX	1
* 6	152547-2	POSITIONER ASSY, HEADSTOCK, 450 kg	1
7	147033-1	SUPPORT, 450 kg DRIVE ASSY, MAIN	1
8	132652-12	PIN, DOWEL, M12 X 30	2
9	147103-1	PLATE, BACK UP	2
10	146818-2	PLATE, MTG, POWER/ENCODER	1
NS	152800-1	CABLE ASSY, POWER, 1.3 kW	1
NS	152970-1	CABLE ASSY, ENCODER, 1.3 kW	1
NS	146482-1	CABLE ASSY, LIMIT SWITCH	1
NS	146482-3	CABLE ASSY, LIMIT SWITCH	1
NS	479348-2	BATTERY ASSY, BACKUP	1

\* For parts list breakdown of 500 kg headstock, refer to the MH-Series Sigma III Positioner Manual (P/N 152763-1).

NS = Not Shown

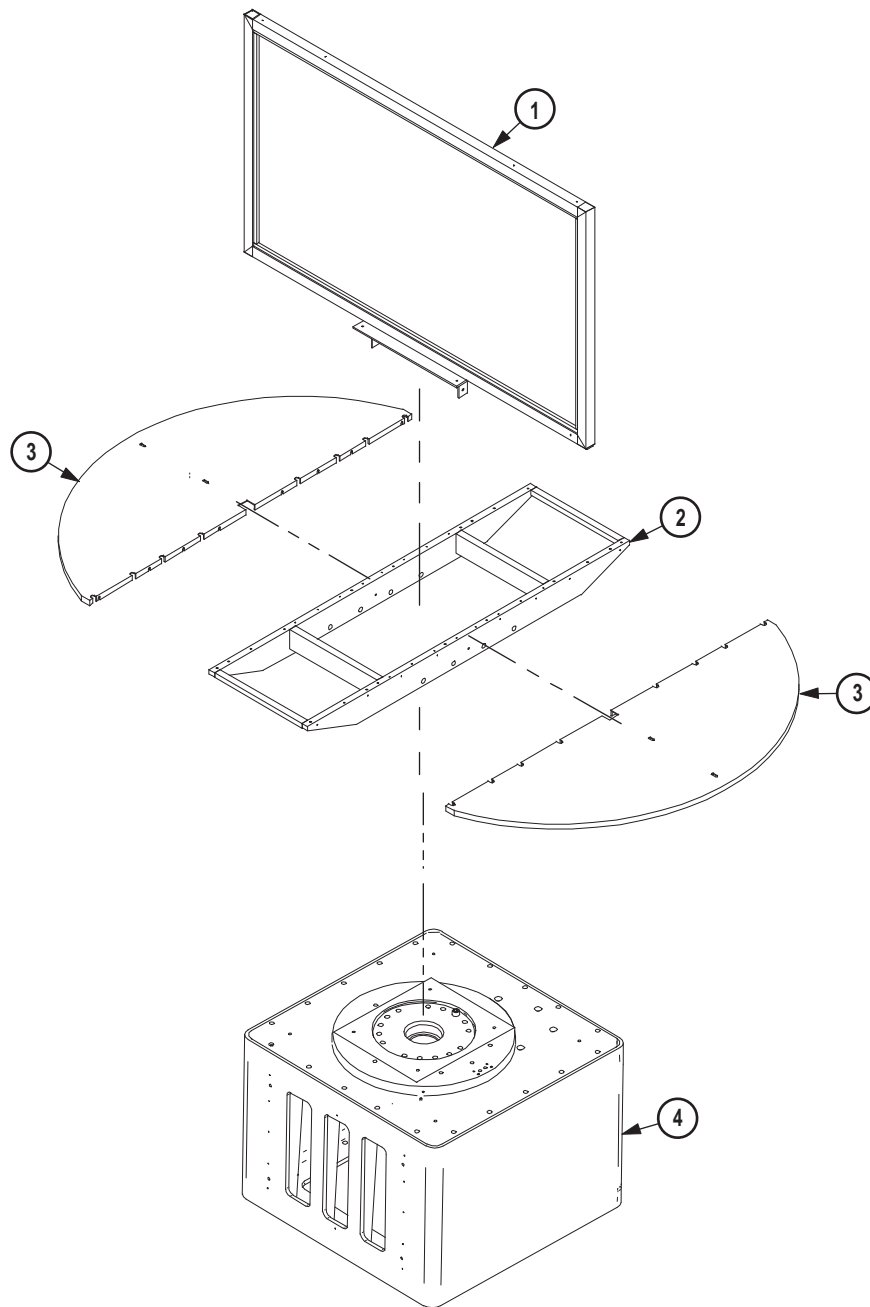


Figure A-2 MSR500/1000 Components

**NOTE:** The MSR500 (high speed) and MSR1000 (low speed) drive assemblies have the same common parts except for the gear reducer and gear pinion components.



Table A-2 Parts List – MSR500/1000 Common Components

<i>Figure A-2 Item Number</i>	<i>Motoman Part Number</i>	<i>Description</i>	<i>QT Y</i>
	152960-1 152960-2	POSITIONER ASSY, MSR1000 POSITIONER ASSY, MSR500	1
1	146710-1	SCREEN ASSY, POSITIONER	1
2	146174-1	FRAME, TABLE, POSITIONER, ROTARY	1
3	146176-1	SHIELD, TABLE, POSITIONER, ROTARY	2
4	146356-1 146356-2	POSITIONER ASSY, 500 kg POSITIONER ASSY, 1000 kg	1 1
NS	152009-4	CABLE ASSY, POWER, 4.5 kW	1
NS	152850-4	CABLE ASSY, ENCODER, 4.5 kW	1
NS	479348-2	BATTERY ASSY, BACKUP	1

\* For parts list breakdown of drive assembly, refer to the MH-Series Sigma III Positioner Manual (P/N 152763-1).

NS = Not Shown

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